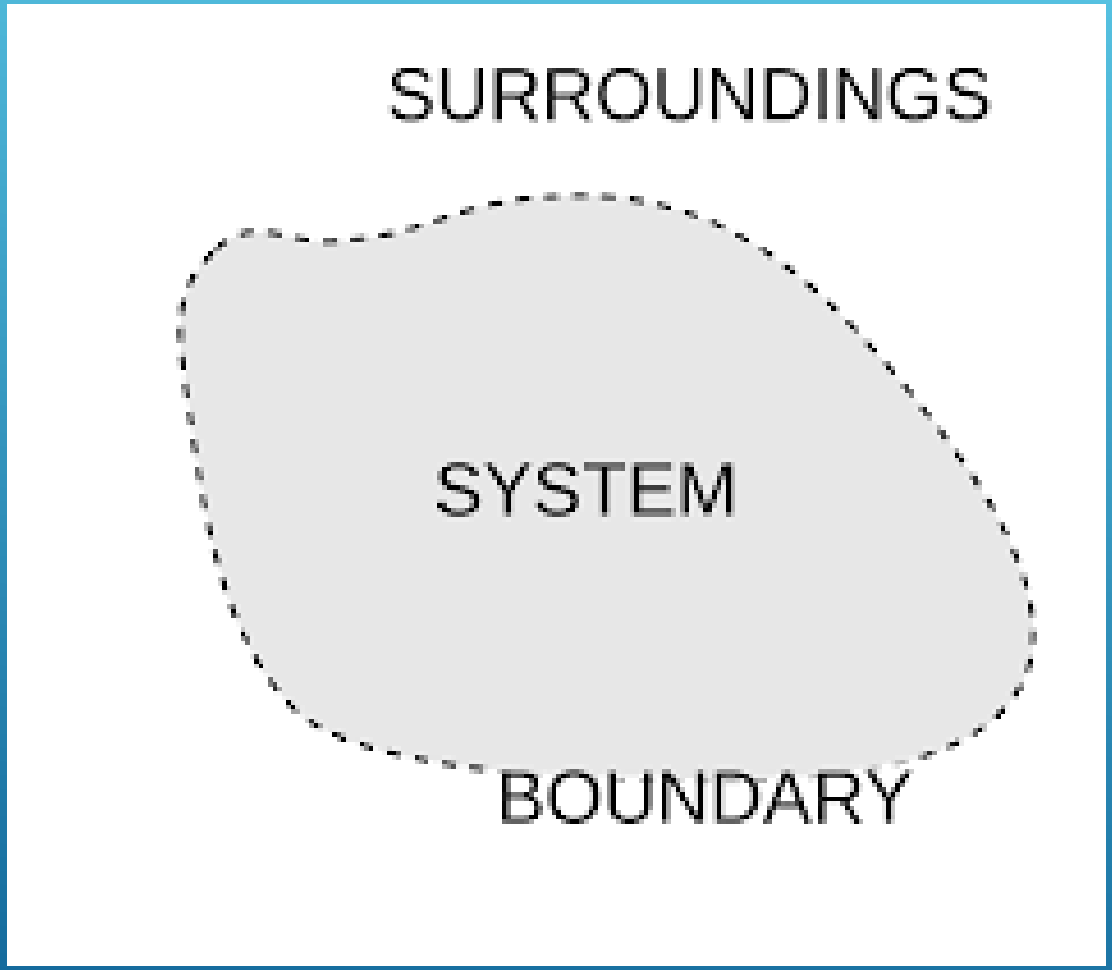
THERMODYNAMICS LECTURE 101

1. Thermodynamics systems
   a. Open system
   b. Close system
   c. Isolated system
2. Basic Principles
   a. Newton's Laws

ENGR. RAMON L. PITAO, JR.
FACULTY-SCHOOL OF ENGINEERING
BILIRAN PROVINCE STATE UNIVERSITY

What is thermodynamics systems?

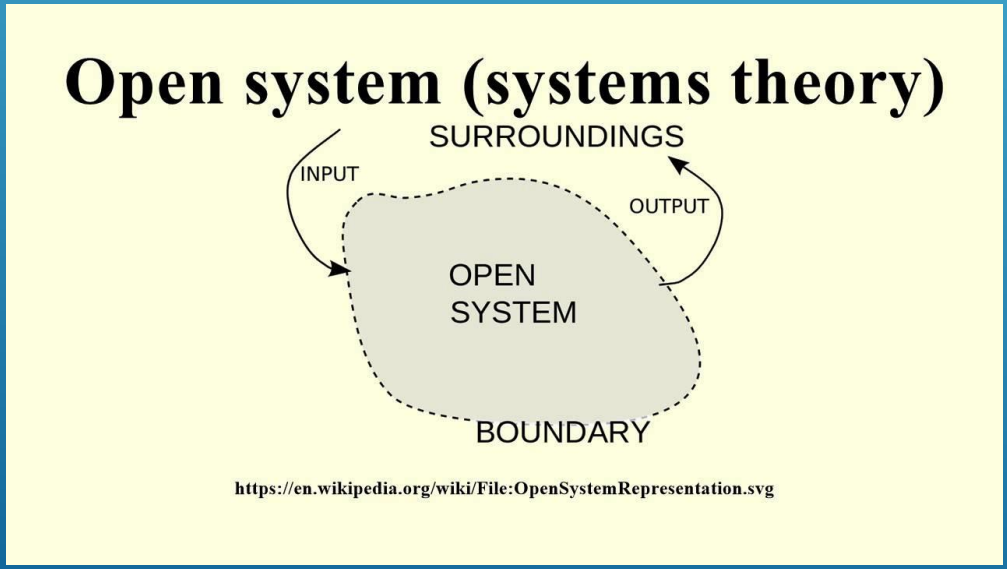


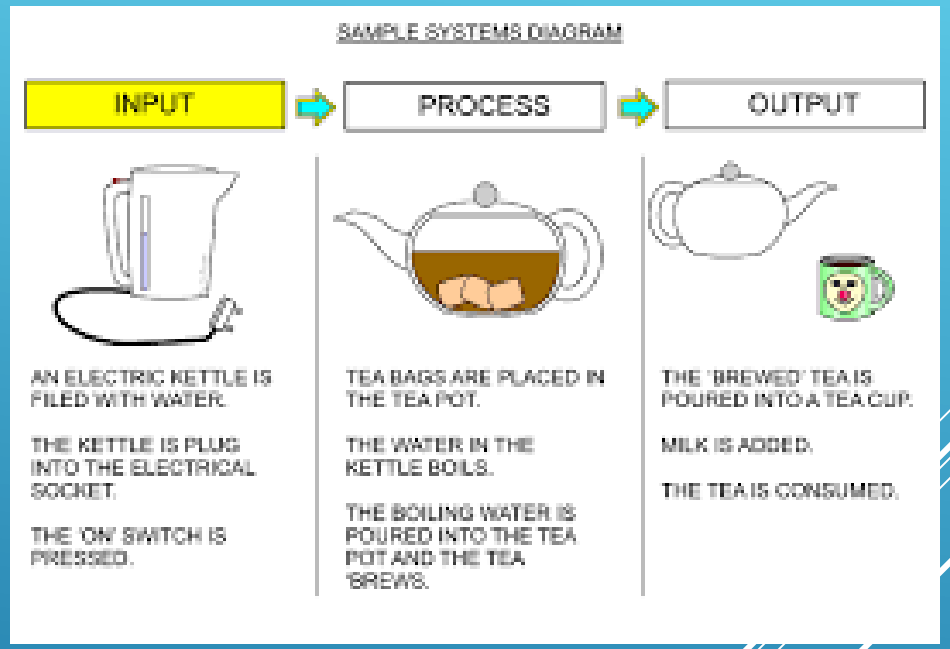
A thermodynamic system is a part of the physical universe with a specified boundary for observation. A *system* contains a substance with a large amount of molecules or atoms, and is formed by a geometrical volume of macroscopic dimensions subjected to controlled experimental conditions. https://www.sciencedirect.com/topics/engineering/thermodynamic-system

*A **thermodynamic system** includes anything whose thermodynamic properties are of interest. It is embedded in its **surroundings** or **environment**; it can exchange heat with, and do work on, its environment through a **boundary**, which is the imagined wall that separates the system and the environment. From Physics LibreText*

Open system

An open system is a system that has external interactions. Such interactions can take the form of information, energy, or material transfers into or out of the system boundary, depending on the discipline which defines the concept.
https://en.wikipedia.org/wiki/Open_system_(systems_theory)

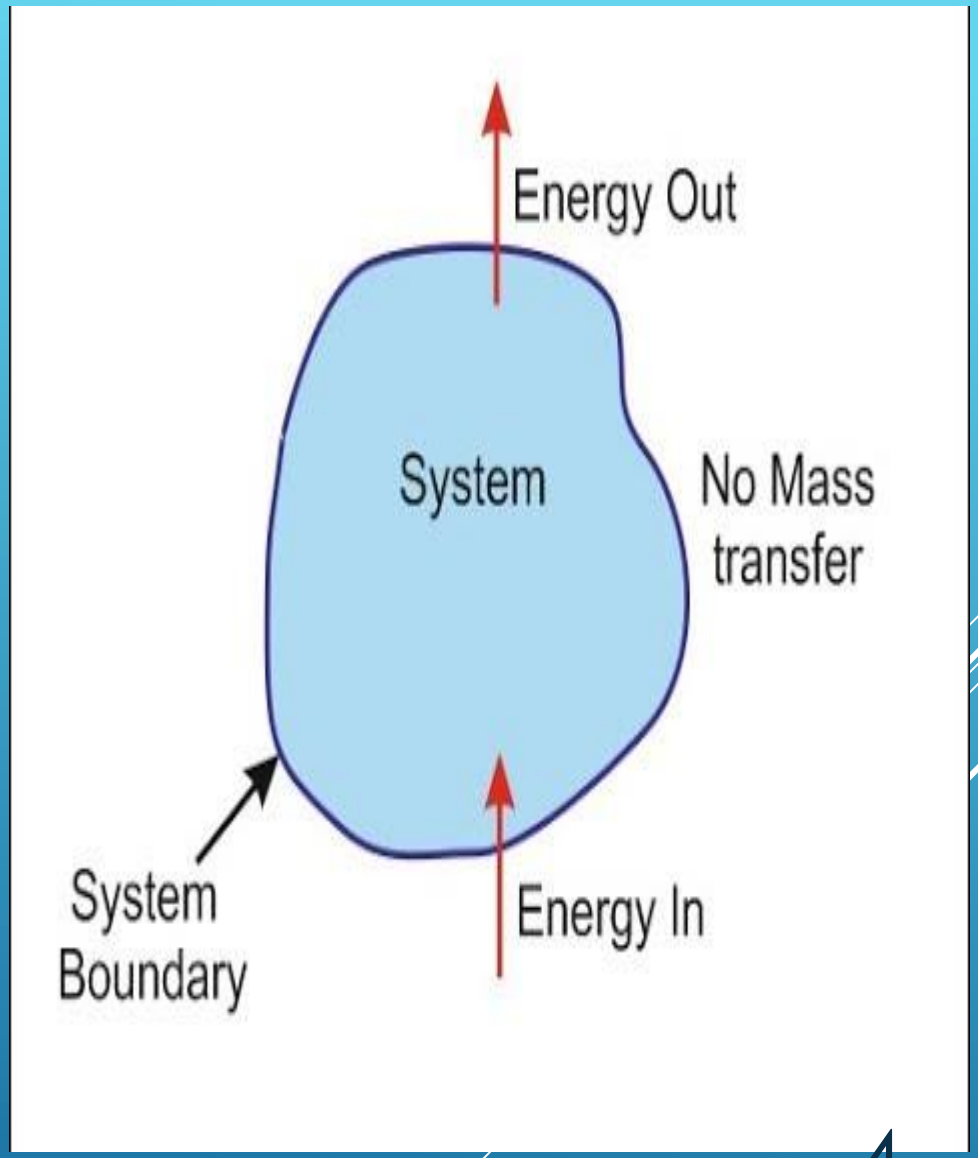




Close system

In a *closed system*, a material content is fixed and an internal mass changes only due to a chemical reaction. Closed systems exchange energy only in the form of heat or work with their surroundings.

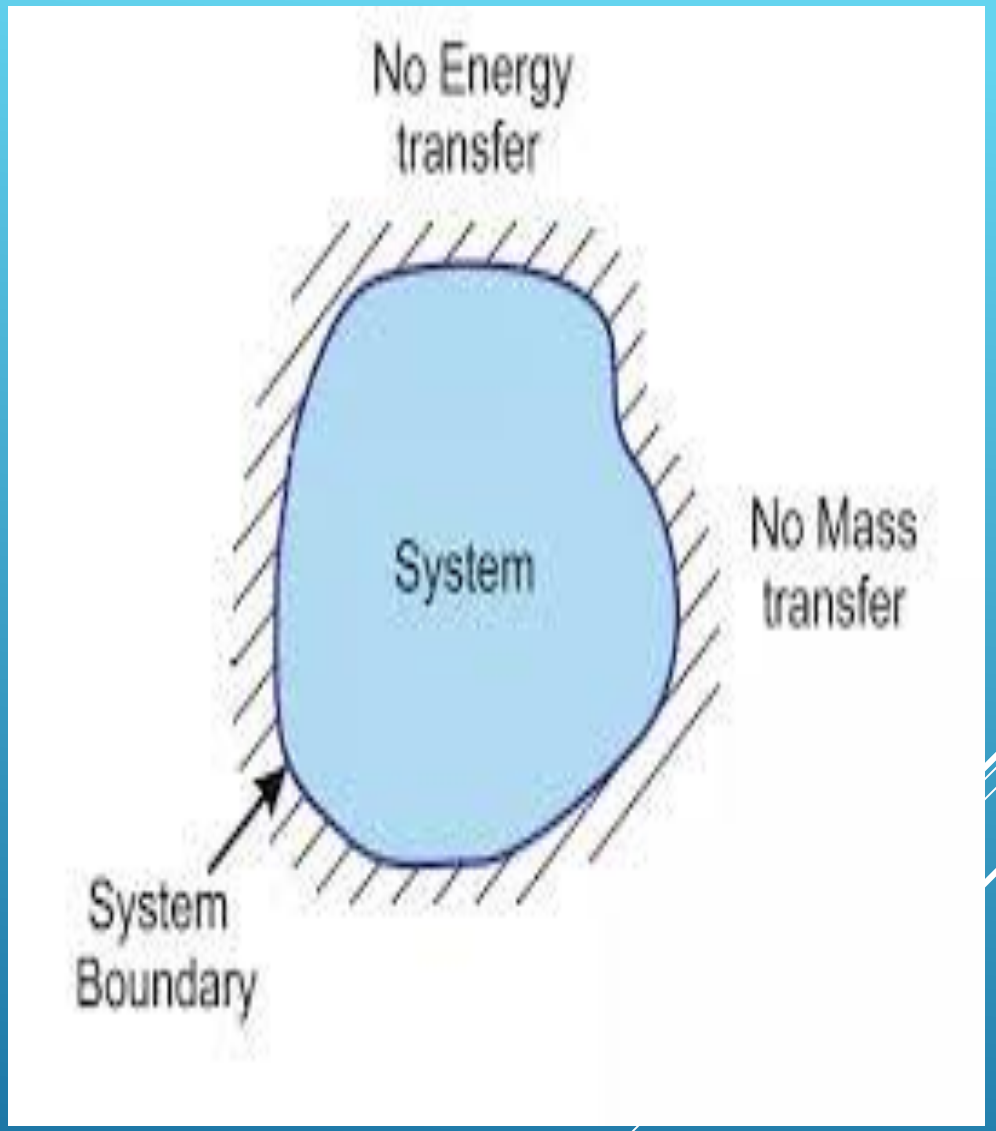
https://www.sciencedirect.com/topics/engineering/thermodynamic-system



Isolated

An isolated system is a thermodynamic system that cannot exchange either energy or matter outside the boundaries of the system. There are two ways in which this may occur: The system may be so distant from another system that it cannot interact with them.

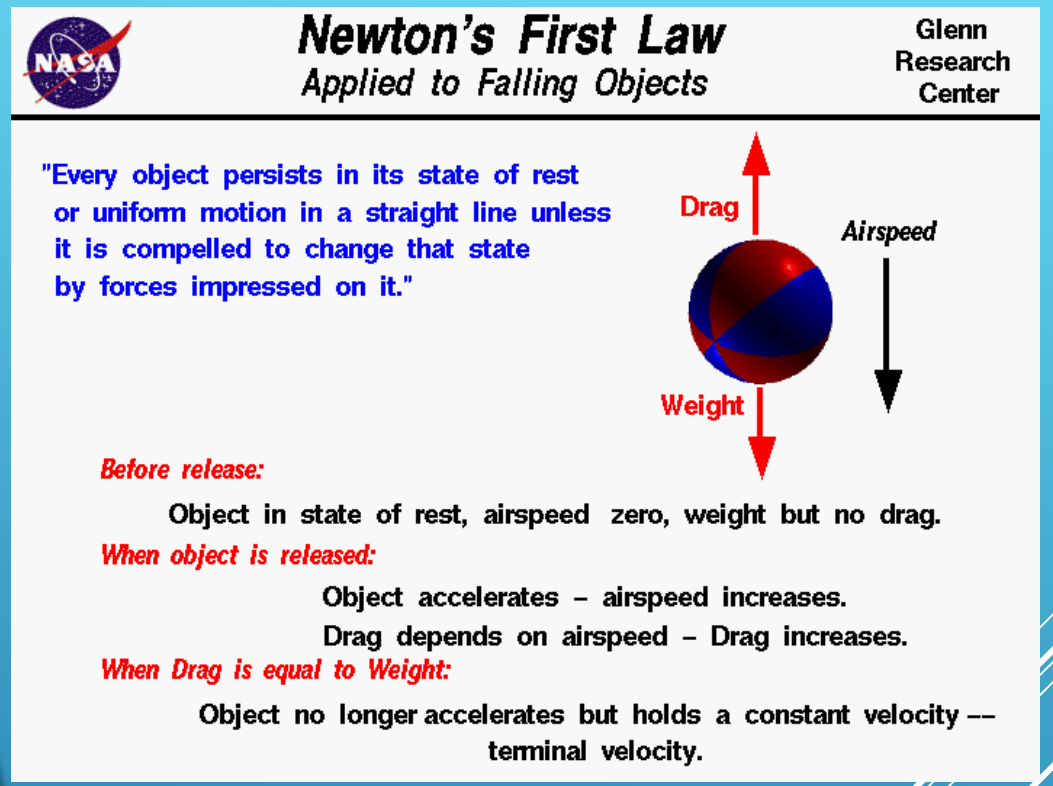
https://www.thoughtco.com/definition-of-isolated-system-605270

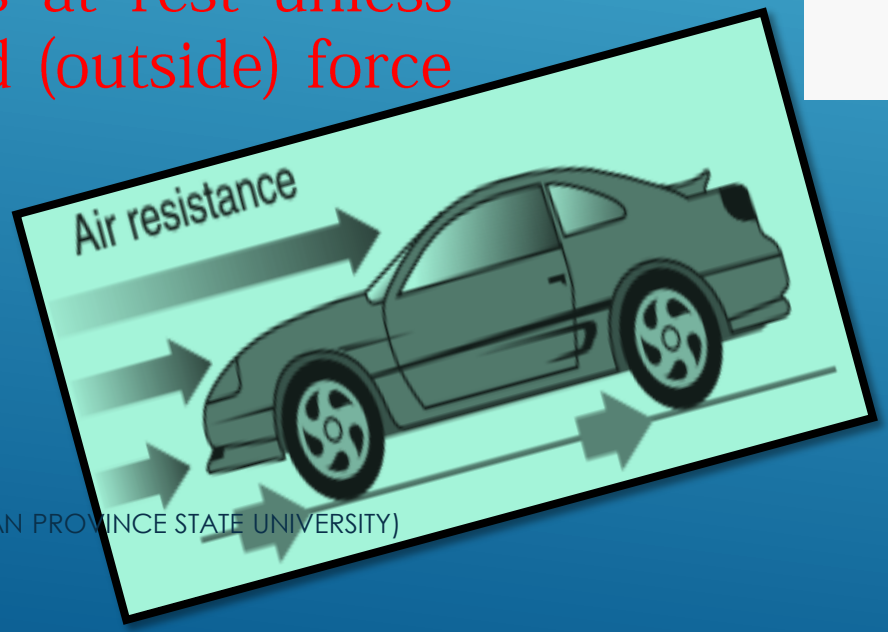


Basic Principles

Newton's First Law (the Law of Inertia)

It is the Law of inertia. A body that is in motion continues in motion with the same velocity (at constant speed and in a straight line) and a body at rest continues at rest unless an unbalanced (outside) force acts upon it.



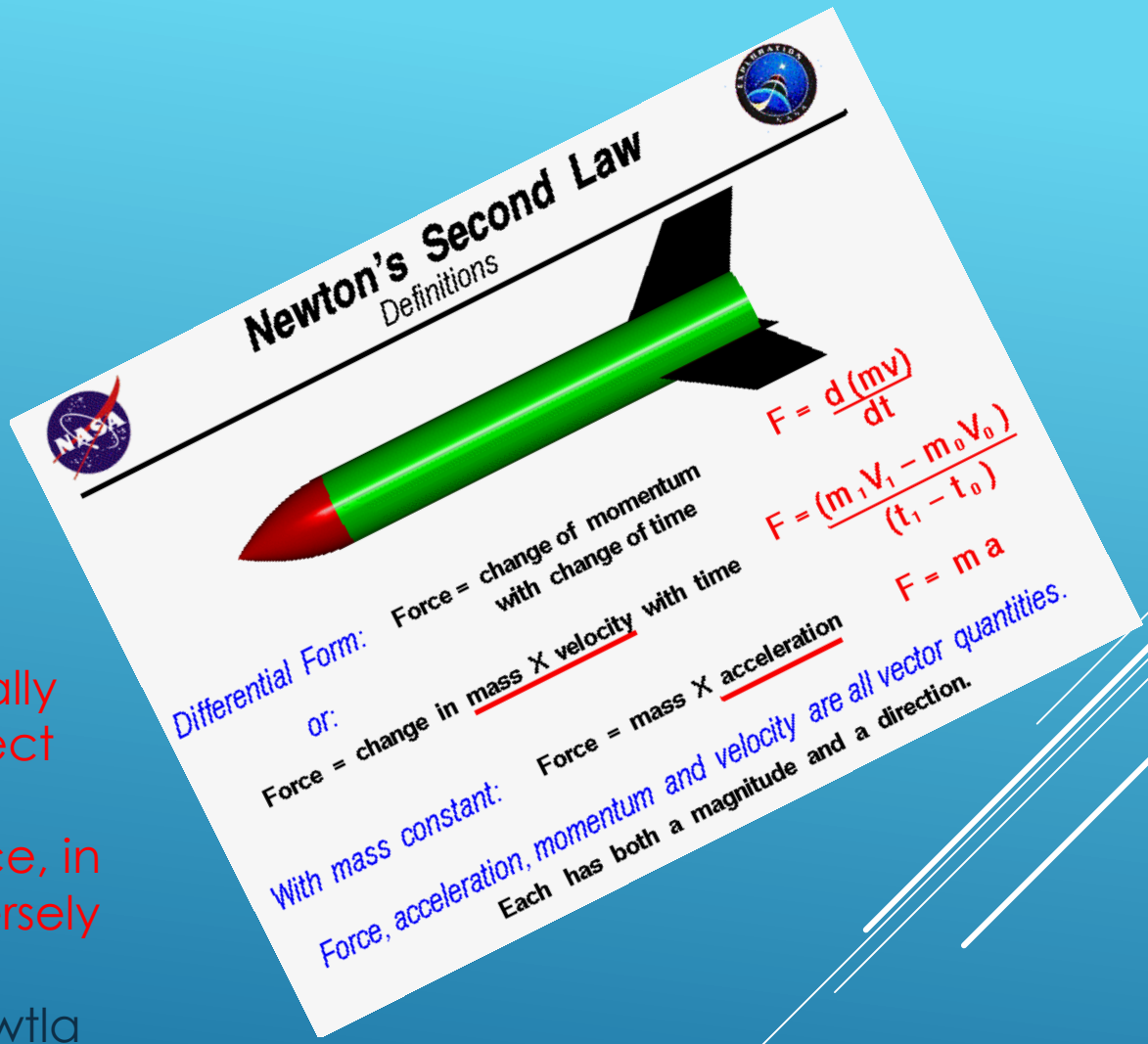


Basic Principles

Newton's Second Law (Law of Acceleration)

The Law of acceleration. The total force acting on a body is equal to the mass of the body times its acceleration.

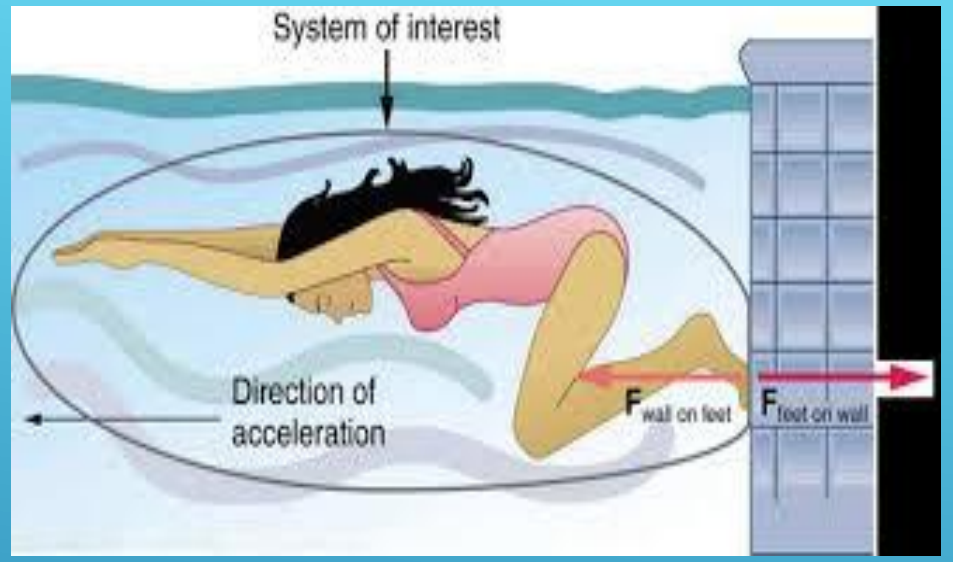
Newton's **second law of motion** can be formally stated as follows: The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object.
https://www.physicsclassroom.com/class/newtlaws/Lesson-3/Newton-s-Second-Law



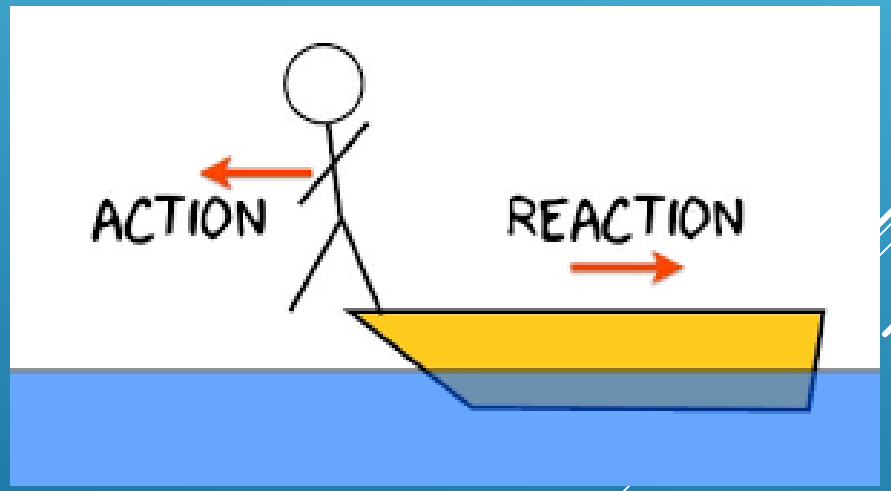
Basic Principles

Newton's Third Law (Law of Acceleration)

When forces act in the same or opposite directions (in one dimension), the total, or net, force can be found by adding the forces that act in one direction and subtracting the forces that act in the opposite direction.



Formally stated, **Newton's third law** is: For every action, there is an equal and opposite reaction. The statement means that in every interaction, there is a pair of forces acting on the two interacting objects. The size of the forces on the first object equals the size of the force on the second object.



THANK YOU FOR WATCHING PLEASE **LIKE AND SUBSCRIBE**.

EMAIL: rpitao@bipsu.edu.ph
FB Page: @ramzreview
YouTube: R-review for ENGINEERING